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N64-15892 *

CODE-1

(NASA CR-55716; 55)

1. IMPROVEMENT OF NICKEL-CADMIUM
BATTERIES

MONTHLY TECHNICAL PROGRESS REPORT (NO. 33)

20 Dec. 1963 -
20 Jan. 1964

COVERING THE PERIOD

20 December 1963 to 20 January 1964

* cite only
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OTS PRICE

XEROX	\$	<u>1.10 ph</u>	1964
MICROFILM	\$	<u>0.80 mf.</u>	

(
NASA Contract No. NAS 5-1048
INLAND TESTING LABORATORIES
Cook Technological Center
Dayton, Ohio
)

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PROGRESS REPORT NO. 33

I. INTRODUCTION

This progress report is submitted in accordance with Article I and Item 2 of Article II, of Contract NAS 5-1048.

II. CONTRACT OBJECTIVE

The objective of this contract is to improve nickel-cadmium batteries through testing and analysis of failures. Specifically, a number of batteries developed by manufacturers under NASA Contracts are being subjected to operational and environmental testing to determine failure rates and modes of failure. From these results specific suggestions for the proper application and possible improvement of this battery type may be made.

III. PROGRAM FOR THE REPORT PERIOD

Cycle-life tests were continued and data recorded on the following groups of cells:

<u>Number of Cells in Original Group</u>	<u>Mfr.</u>	<u>Depth of Discharge</u>	<u>Temp. °C</u>	<u>Cycles Completed</u>
10	Sonotone	10%	25	6200+
10	Gulton	10%	25	6200+
10	Gould	10%	25	6200+
10	Sonotone	10%	50	6000+
10	Gulton	10%	50	6000+
10	Gould	10%	50	6000+

<u>Number of Cells In Original Group</u>	<u>Mfr.</u>	<u>Depth of Discharge</u>	<u>Temp. °C</u>	<u>Cycles Completed</u>
10	Sonotone	25%	25	5800+
10	Gould	25%	25	3100+
10	Gulton	25%	25	5800+
10	Sonotone	10%	-10	5700+
5	Gould	10%	-10	4600+
10	Gulton	10%	-10	5700+
4	Sonotone	40%	25	4700+

No cells failed (discharge voltage below 0.9 volt) or were removed from cycling during the report period. However, the end-of-discharge voltage data for a few cells show evidence of impending failure of these cells.

IV. PROGRAM FOR THE NEXT PERIOD

1. Continue and record data on cycle-life tests in progress at 25°C, -10°C, and 50°C.
2. Continue evaluation of data being accumulated.
3. Continue investigation of failed cells.

FINANCIAL CONDITION

CONTRACT NAS 5-1048

MONTHLY PROGRESS REPORT NO. 33

20 December 1963 to 20 January 1964

*Funds Expended During Report Period	\$ 190
*Commitments	None
*Total Funds Expended Including Commitments	56,630
*Funds Remaining	247

* All Amounts are Less G & A and Fee

DISPOSITION OF GULTON CELLS - REPORT NUMBER 33

Cells - Failed Initial Tests - - - - 7
Cells - Failed in Cycling - - - - 5
Cells - Now Cycling - - - - 35
Cells - Not Used in Cycling - - - - 3*

* 3 Cells bulged after initial tests

CELLS FAILED INITIAL TESTS

Electrolyte Leakage - - - - 5
Electrical Leakage - - - - 2

CELLS FAILED IN CYCLING

At 50°C - 10% Discharge (5632 Cycles) - - - - 1
At 35°C - 10% Discharge (2262 Cycles) - - - - 1
At 25°C - 25% Discharge (1298 Cycles) - - - - 1
At 25°C - 25% Discharge (1270 Cycles) - - - - 1
At 25°C - 25% Discharge (1416 Cycles) - - - - 1
Total - - - - 5

CELLS NOW CYCLING

At 25°C - 10% Discharge - - - - 9
At 25°C - 25% Discharge - - - - 7
At 50°C - 10% Discharge - - - - 9
At -15°C - 10% Discharge - - - - 10
Total - - - - 35

* Cells cycling on special test are the three cells reported above as having bulged after initial tests and are in addition to the total now cycling (35) shown above.

DISPOSITION OF GOULD NATIONAL CELLS - REPORT NUMBER 33

Cells - Failed Initial Tests - - - - -	23
Cells - Failed in Cycling- - - - -	13
Cells - Now Cycling- - - - -	27
Cells - Not Used in Cycling- - - - -	2*

* One cell bulged, one leaked after initial tests

CELLS FAILED INITIAL TESTS

Electrolyte Leakage - - - - -	23
Electrical Leakage- - - - -	2 (Failed Both Initial Tests)

CELLS FAILED IN CYCLING

50°C - 10% Discharge (2668, 2973, 3216, 3372, 3576, and 5536 cycles) - - - -	6
25°C - 40% Discharge (864, 864, 1282 cycles - cycling stopped on remaining two cells - Dischg. voltage 1.02 and 1.00V - - - -	5
25°C - 25% Discharge (2487 Cycles) - - - - -	2
Total	13

CELLS NOW CYCLING

At 25°C - 10% Discharge - - - - -	10
At 50°C - 10% Discharge - - - - -	4
At -10°C - 10% Discharge- - - - -	8
At 25°C - 25% Discharge - - - - -	5
Total	27

NOTE: This last group totaling 5 cells is from the group of 23 cells reported as having electrolyte leakage. They were sent to the manufacturer for examination returned to this facility, and are now cycling as indicated.

DISPOSITION OF SONOTONE CELLS - REPORT NUMBER 33

Cells - Failed Initial Tests - - - - -	6
Cells - Failed in Cycling to Date- - - - -	7
Cells - Now Cycling - - - - -	37

CELLS FAILED INITIAL TESTS

Electrolyte Leakage - - - - -	4
Electrical Leakage- - - - -	3

CELLS FAILED IN CYCLING TO DATE

50°C - 10% Discharge (3288, 4008, 4281, 5031, 5100, and 5545 Cycles) - - - - -	6
25°C - 40% Discharge (837 Cycles)- - - - -	1
Total	7

CELLS NOW CYCLING

At 35°C - 10% Discharge- - - - -	10
At 35°C - 25% Discharge- - - - -	10
At 35°C - 40% Discharge- - - - -	3
At 50°C - 10% Discharge- - - - -	4
At -10°C - 10% Discharge - - - - -	10
Total	37